Indian Journal of Science and Technology, Vol 9(41), DOI: 10.17485/ijst/2016/v9i41/91747, November 2016
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Big Data Analysis in the Internet of Things Platform

P. Parthiban[1]* and S. Selvakumar[2]

[1]Computer Science and Engineering, Bharath University, Chennai - 600073,Tamil Nadu, India; Parthiban.prathiba@gmail.com

[2]Computer Science and Engineering, GKM College of Engineering and Technology, Affiliated to Anna University, Chennai - 600063,Tamil Nadu, India; sselvakumar@ieee.org

Abstract

Objectives: The implementation of an Industry neutral architecture for an analysis on Big Data in the Internet of Things Platform. **Methods/Statistical Analysis**: The Outside temperature , Light and Humidity from weather station is monitered in dashboardand analyzed in ThingSpeak - Internet of Things Platform. The analysis on weather station data is performed using Matlab in ThingSpeak – Internet of Things Platform. **Findings:**To do a real time analysis of weather station data using ThingSpeak – Internet of Things Platform. Real time tracking of the attributes include dew point, temperature and humidity from the Arduino Sensor device which is installed on Weather Station. **Application/Improvements:** Internet of Things Platform broad network access allows investors/stakeholders to visualize the output of Data Presentation (Data Analytics, Data Visualization, BI reporting), easily from multiple locations and platforms, which can facilitate enterprise decision making and here we recommend solutions for the security and privacy issues in the Internet of Things Platform.

Keywords: Analyzing, Big Data, Internet of Things, Internet of Things Security,ThingSpeak

1. Introduction

Internet of Things is the next evolution in the IT industry. The challenges in the Internet of Things is the collection of large amount of data with the rapid development of digitization large amount of structured, unstructured and semi-structured data are created fastly. The security and Privacy issues are the big challenge in the Internet of Things. The core components include cloud computing, business analytics, and big data which are the backbone for the Internet of Things Platform.

Internet of Things Platform is running on the Cloud Environment to achieve scalability, high availability, resilience from attacks, incident response, preventive control, integrity, confidentiality, accountability, and assurance.

Internet of Things Platform uses the descriptive, predictive, prescriptive and Diagnostic analytics to achieve enterprise level decisions. The descriptive analytics takes the historical data to make decisions. The predictive analytics takes the historical and current data to make decisions. The prescriptive analytics takes the historical and current data plus business rules to make decisions.

Big data platform Hadoop is used to extract structured data using Sqoop and Hiho and to extract unstructured data using flume[1].Mining of biomedical data analysis will be complex procedures that require several multimodels in medical image diagnosis.Region of Interests (ROIs) identification, feature extraction, feature selection and discretization, association rule mining and classification are part of the proposed system. Web Services can be used to access applications that is running on cloud. The medical data contains of unstructured data such as image and we need an efficient algorithm in order to process the image. There are different sources in the organization to get data and need to be captured and stored in the databases[2]. Extraction of medical data is an important step in any medical domain industry. The challenges in the medical domain is to capture, store and process the medical data[3].

Diagnosis of medical data is done through machine learning algorithms includes decision tree and Bayesian theorem and is helpful for the physicians to make treatment decisions[4]. Ambient Intelligent system which can able to forward the results to the remote health information system and uses a mobile device to assist health

*Author for correspondence

practitioners[5]. Web servers are running in the remote location and can be easily accessed over the internet by the end users from any part of the world. Client can able to access services over via internet[6]. Web framework is used to process complex data that is coming from different sources of the system and is required to integrate the data to arrive at meaningful information for the physicians to make better decisions[7].

A Service Oriented Architecture-based (SOA) platform is used to process medical image for assisting physicians to get diagnosis to make decisions. SOA can reuse and maintain the systems. In SOA, the most substantial element is to give the service for the clients to access from remote location. SOA-based systems can provide better platform for processing medical image data. A component-based platform is not been any part of the programming language[8]. A Computer-Aided Diagnosis (CAD) system can be used to help the doctors to make better decisions by reducing the mistakes. Need to propose web service based method for mining to enhance the diagnosis of medical images. Combining the least features automatically mined from medical image to look for patterns. Medical image data generates diagnosis by applying the association rules[9].

2. Big Data Analysis in the Internet of Things Platform

The goal is to propose an industy neutral architecture for analysis of big data in the internet of things platform is shown in the Figure 1. The proposed architecture is divided into the following components.

2.1 Internet of Things Device

The weather station sensor device sends a data to the ThingSpeak via channel. The internet of things device includes Arduino can be used in the weather station to send a streams to the ThingSpeak.

2.2 ThingSpeak - Internet of things Platform

ThingSpeak – Internet of Things Platform is the open source web service. ThingSpeak can connect to internet of things devices includes Arduino, BeagleBone Black and Raspberry Pi.

3. Experimental Results

In this section, we analyzed weather station sensor data using ThingSpeak – Internet of Things Platform.

3.1 Case Study 1: Weather Station Sensor Data Analysis

In case study 1, the weather station sensor data are captured in real time and analyzed results is shown in the ThingSpeak – Internet of Things Platform.

3.1.1 Sign into ThingSpeak Internet of Things Platform

The ThingSpeak account is created and sign into ThingSpeak – Internet of Things Platform. The following the sign in page for ThingSpeak and is shown in the Figure 2.

3.1.2 Creating a Channel in the ThingSpeak – Internet of Things Platform

The following page is to create a channel in the ThingSpeak – Internet of Things Platfrom and is shown in the Figure 3. The Channel ID is created in the ThingSpeak – Internet of Things Platform and using Channel ID we can write

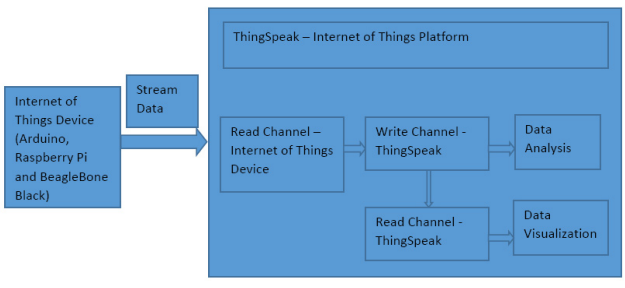

Figure 1. Industry neutral architecture for big data analysis in the Internet of Things platform.

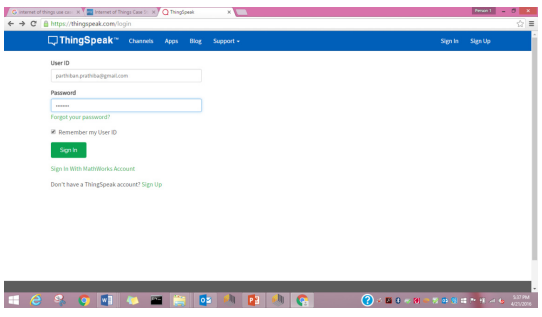

Figure 2. Sign into ThingSpeak Internet of Things platform.

a data from weather station to the write channel in the ThingSpeak – Internet of Things Platform and further we can read data from write channel in the ThingSpeak –Internet of Things Platform to the read channel in the ThingSpeak – Internet of Things Platform.

3.1.3 *Weather Data Analysis using Matlab Code*

The Matlab code is written inside the ThingSpeak – Internet of Things Platformfor the analysis of weather data and Matlab code successfully run in the ThingSpeak – Internet of Things Platform is shown in the Figure 4. The output for the weather station sensor data is analyzed using Matlab code in the ThingSpeak – Internet of Things Platform is shown in the Figure 5.

3.1.4 *Weather Data Visualization using Matlab Code*

The Matlab code is written inside the ThingSpeak - Internet of Things Platform for the visualization of weather data in the real time and Matlab code successfully run in the ThingSpeak – Internet of Things Platform is shown in the Figure 6. The output for the weather station sensor data is visualized using Matlab code in the ThingSpeak – Internet of Things Platform is shown in the Figure 7.

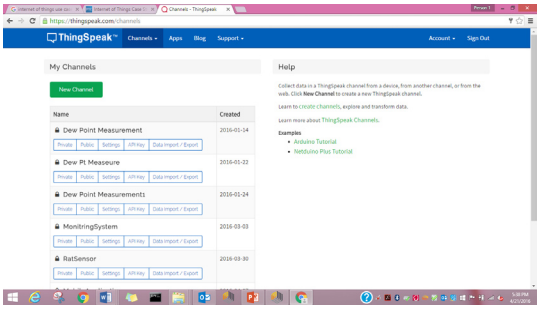

Figure 3. Creating a channel in the ThingSpeak – Internet of Things platform.

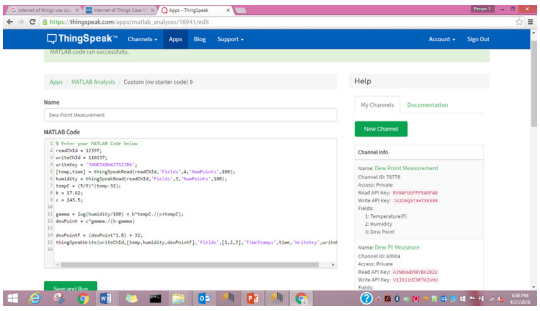

Figure 4. Matlab code for weather data analysis.

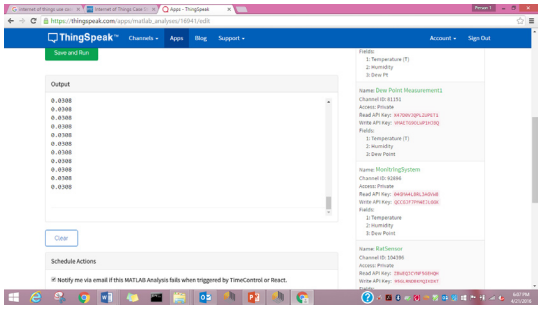

Figure 5. Matlab output for weather data analysis.

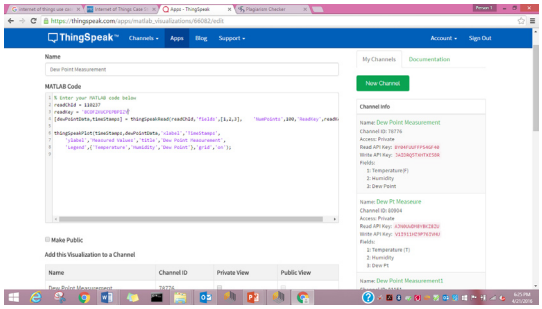

Figure 6. Matlab code for weather data visualization.

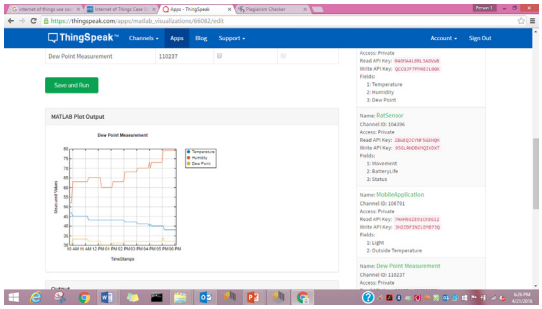

Figure 7. Matlab output for weather data visualization.

4. Conclusions and Future Work

Cloud Computing (CC) can be used together with Internet of Things Platform to gain competitive business advantage and to address the weakness of security, single point of failure and considers issues of future scalability and availability of data, as well as integration of Internet of Things Platform with many technologies and services. There are many cloud service providers (eg Amazon Web Services, Google cloud etc) who provide cloud services integrated with Internet of Things Platform. CC reduces capital expenditure on infrastructure and focuses on operational expenditure, and also offers high availability (24 hour access), on demand service (pay as you go pricing), broad network access (available through many devices – phone, tablets, laptops), resource pooling (sharing of

resources through multiple users), scalability (unlimited storage) and measured service (automatic controlling and optimizing of resources).

5. References

1. Kyoo-sung N, Doo-sik L. Bigdata platform design and implementation model. Indian Journal of Science and Technology. 2015 Aug; 8(18):1–8.
2. Lakshmi M, Sowmya K. Sensitivity analysis for safe grain-storage using big data. Indian Journal of Science and Technology. 2015 Apr; 8(S7):1–9.
3. Jeong YS. Parallel processing scheme for minimizing computational and communication cost of bioinformatics data. Indian Journal of Science and Technology. 2015 Jul; 8(15):1–8.
4. Sherly KK, Nedunchezhian R.A improved incremental and interactive frequent pattern mining techniques for market basket analysis and fraud detection in distributed and parallel systems. Indian Journal of Science and Technology. 2015 Aug; 8(18):1–12.
5. DhamodaranS, Sachin KR, Kumar R. Big data implementation of natural disaster monitoring and alerting system in real time social network using hadoop technology. Indian Journal of Science and Technology. 2015 Sep; 8(22):1–4.
6. Kim KW, Park WJ, Park ST. A study on plan to improve illegal parking using big data. Indian Journal of Science and Technology. 2015 Sep; 8(21):1–5.
7. Kim BS, Kim DY, Kim KW, ParkST. The improvement plan for fire response time using big data. Indian Journal of Science and Technology. 2015 Sep; 8(23):1–5.
8. ParkHW, Yeo Y,Jang H,Kim N. Study on the impact of big data traffic caused by the unstable routing protocol. Indian Journal of Science and Technology. 2015 Mar; 8(S5):59–62.
9. Parthiban P, SelvakumarS. Big data architecture for capturing, storing, analyzing and visualizing of web server logs. Indian Journal of Science and Technology. 2016 Jan; 9(4):1–9.